

# Malaria Introduction

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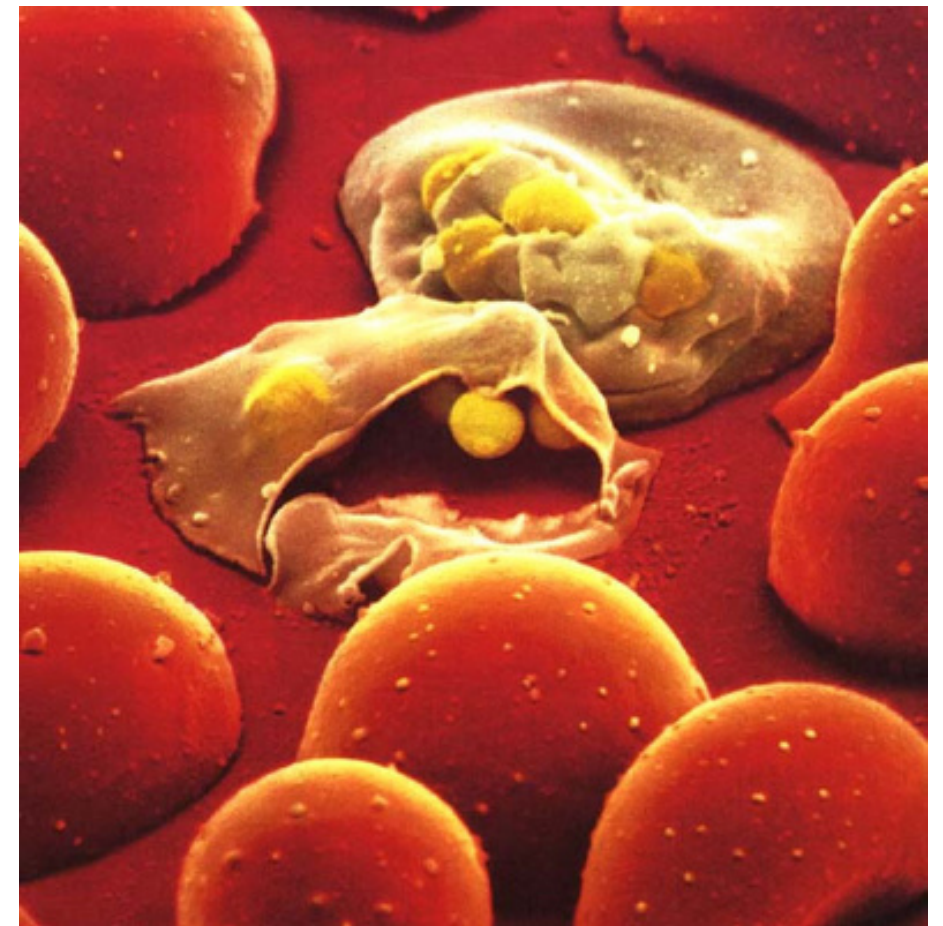
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# Overview

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- Background and impact on the world
- Mechanism behind the disease
- Special case – Pregnancy Associated Malaria.
- Your goal for the next hours.



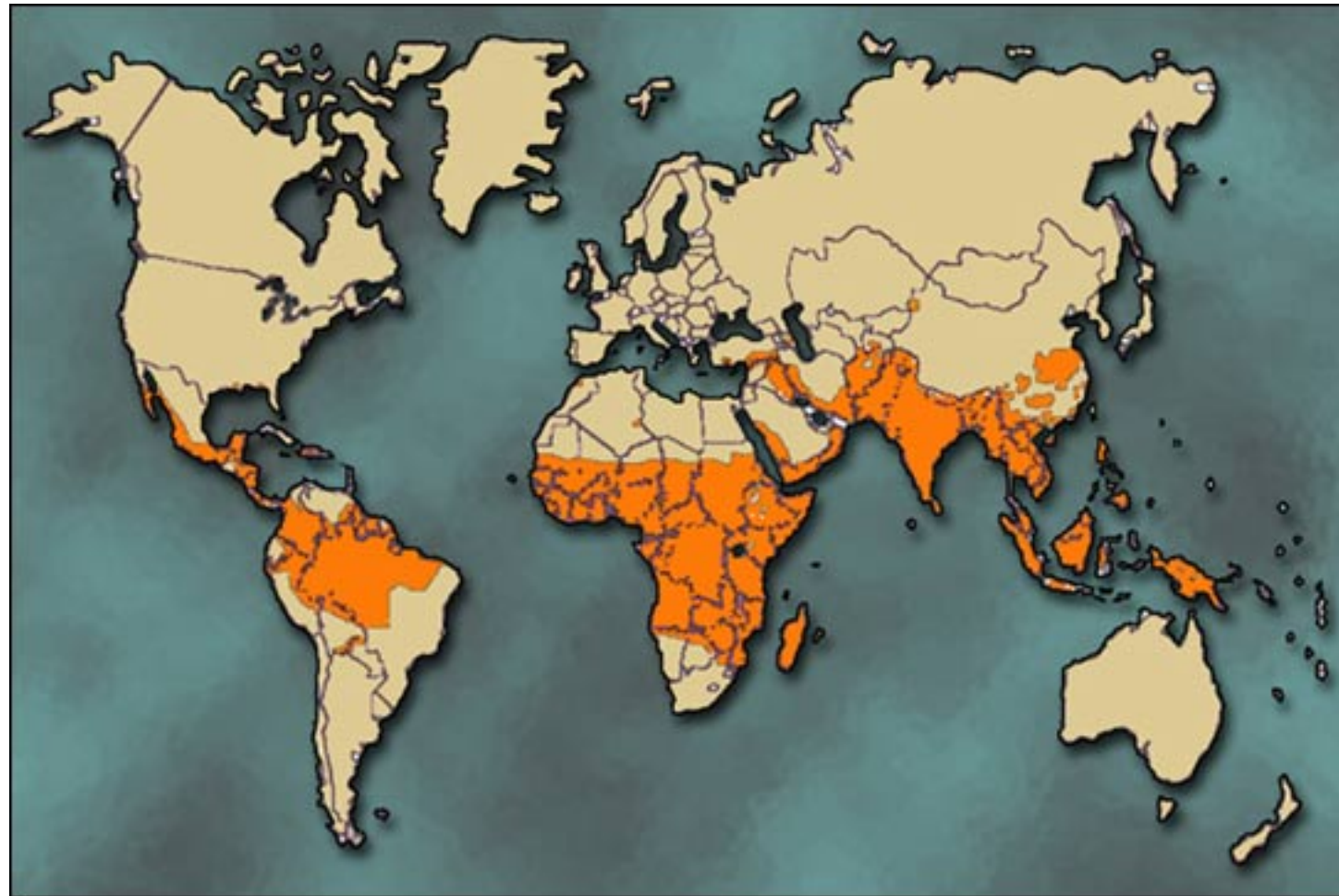
# Malaria

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- Caused by a parasite of the genus *Plasmodium*, mainly:
  - *Plasmodium falciparum* (Africa)
  - *Plasmodium vivax* (Asia and America)
- Transferred to humans by a mosquito of the genus *Anopheles*



# Malaria - a serious problem

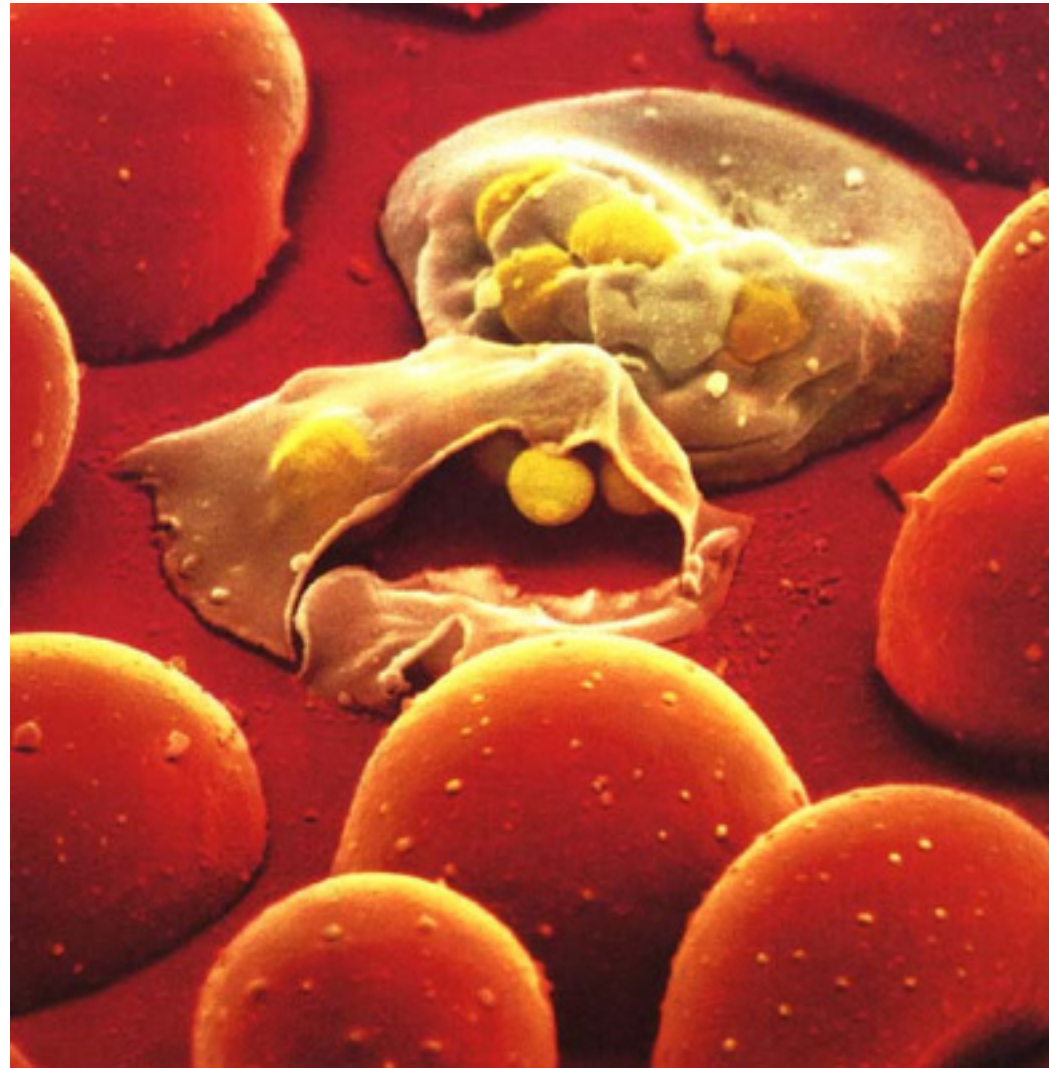


- 243 million cases / 863,000 deaths in 2008
- Only matched by HIV (2.1 mill. deaths (2007)) and TB (1.6 mill. deaths (2005))
- Most victims are children under the age of 5 in sub-Saharan Africa

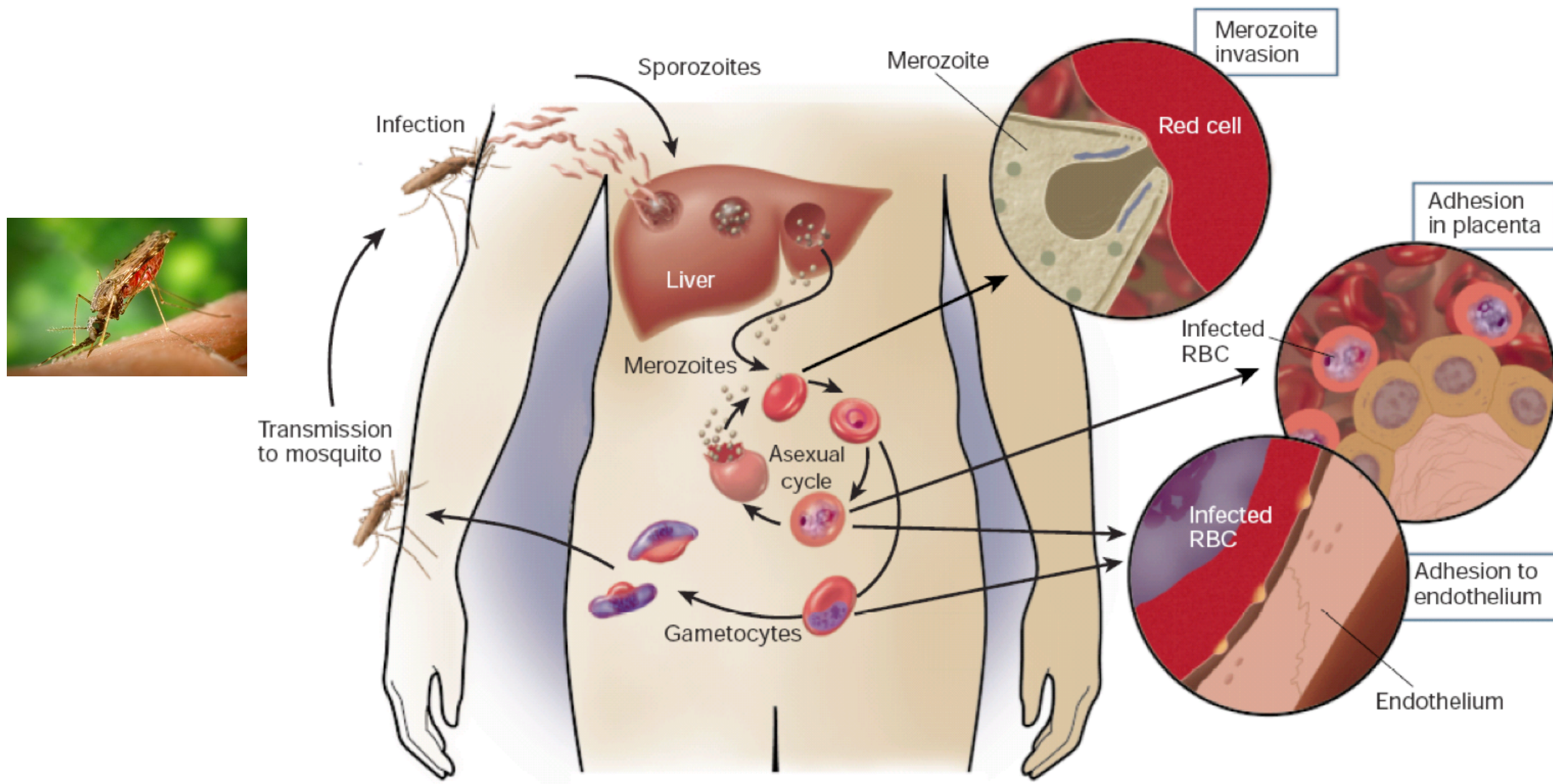


# Infected Red Blood Cells

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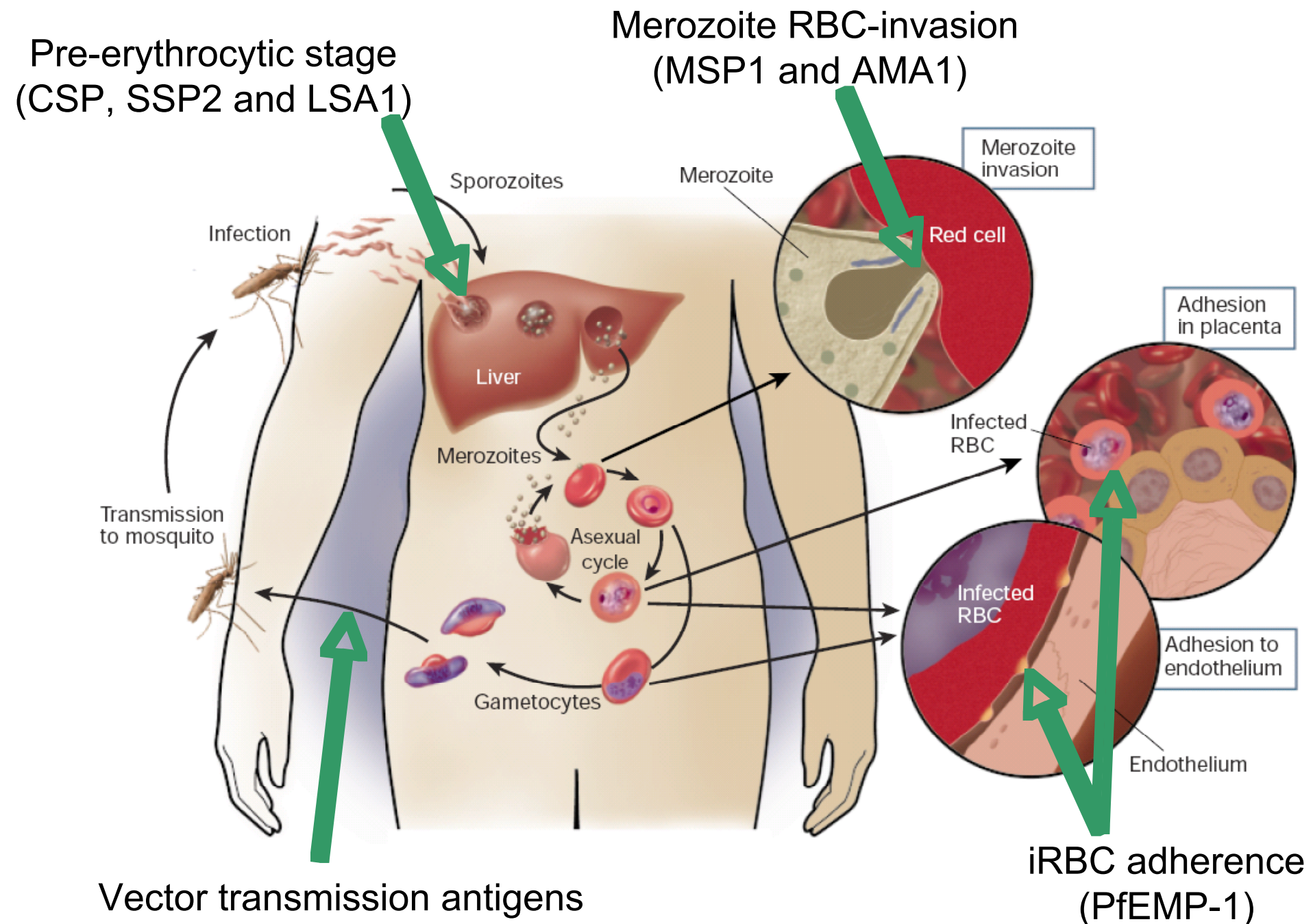


# Malaria - Life cycle



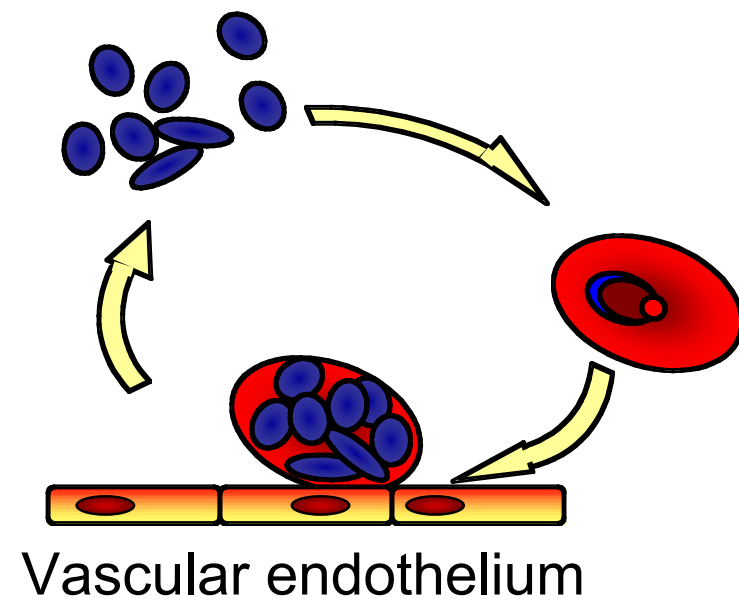


# Malaria - immunological targets



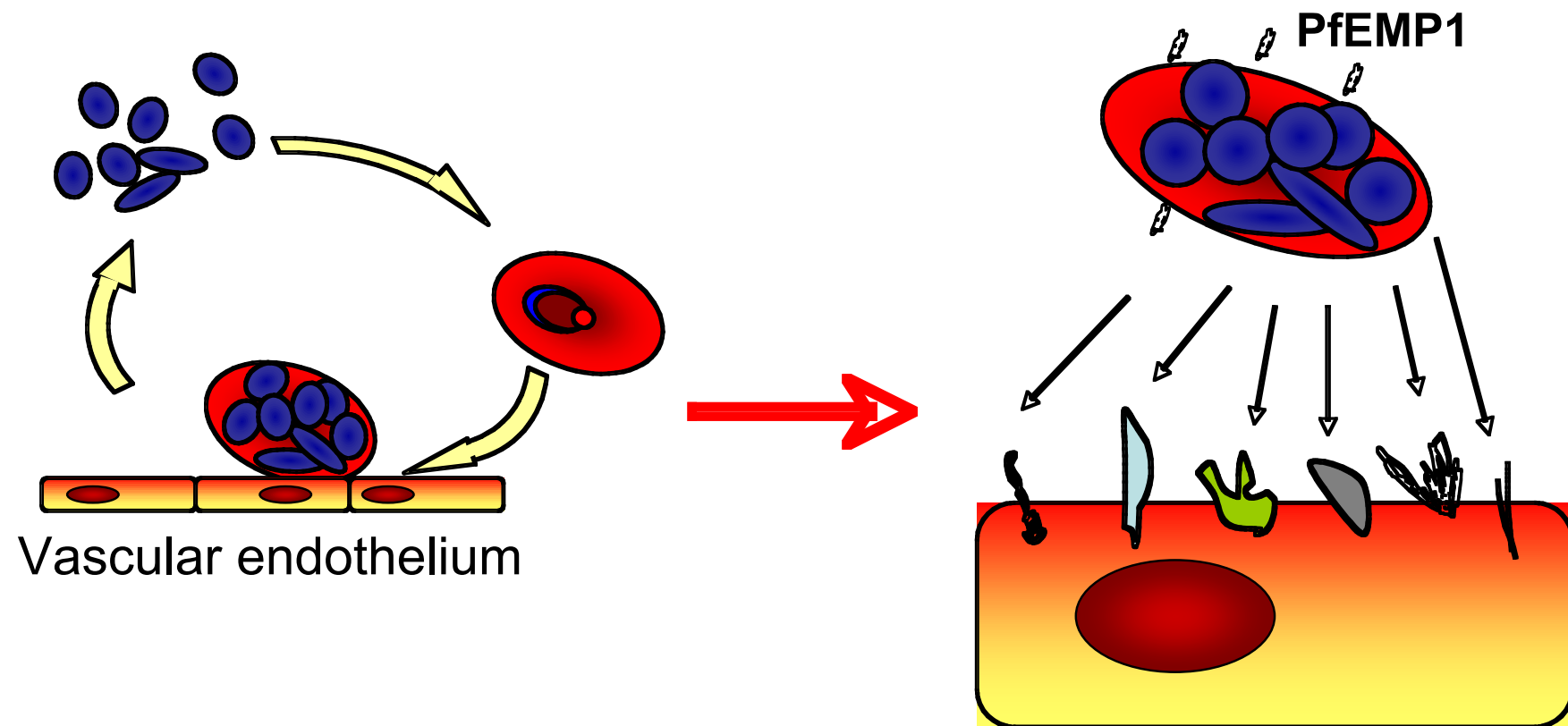
# Blood stage parasites

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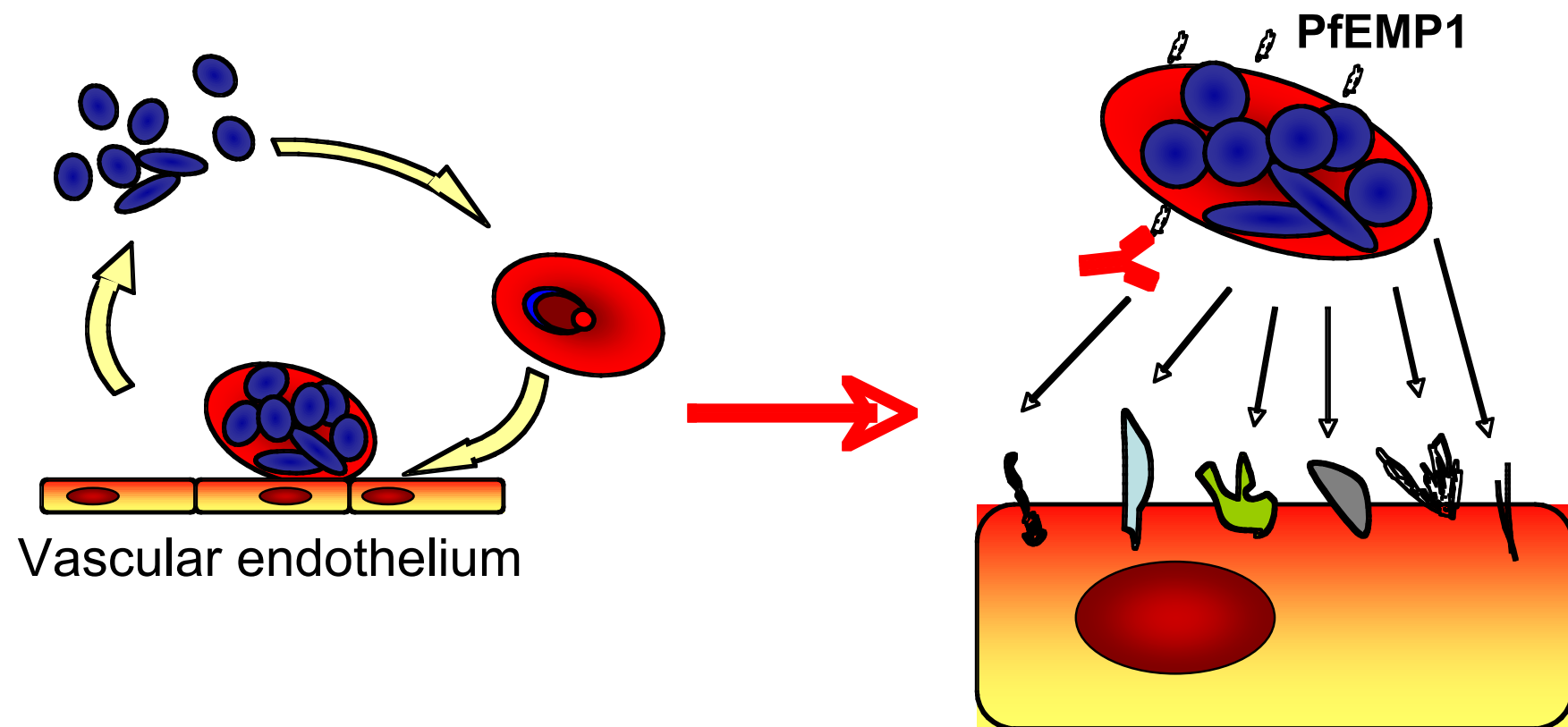




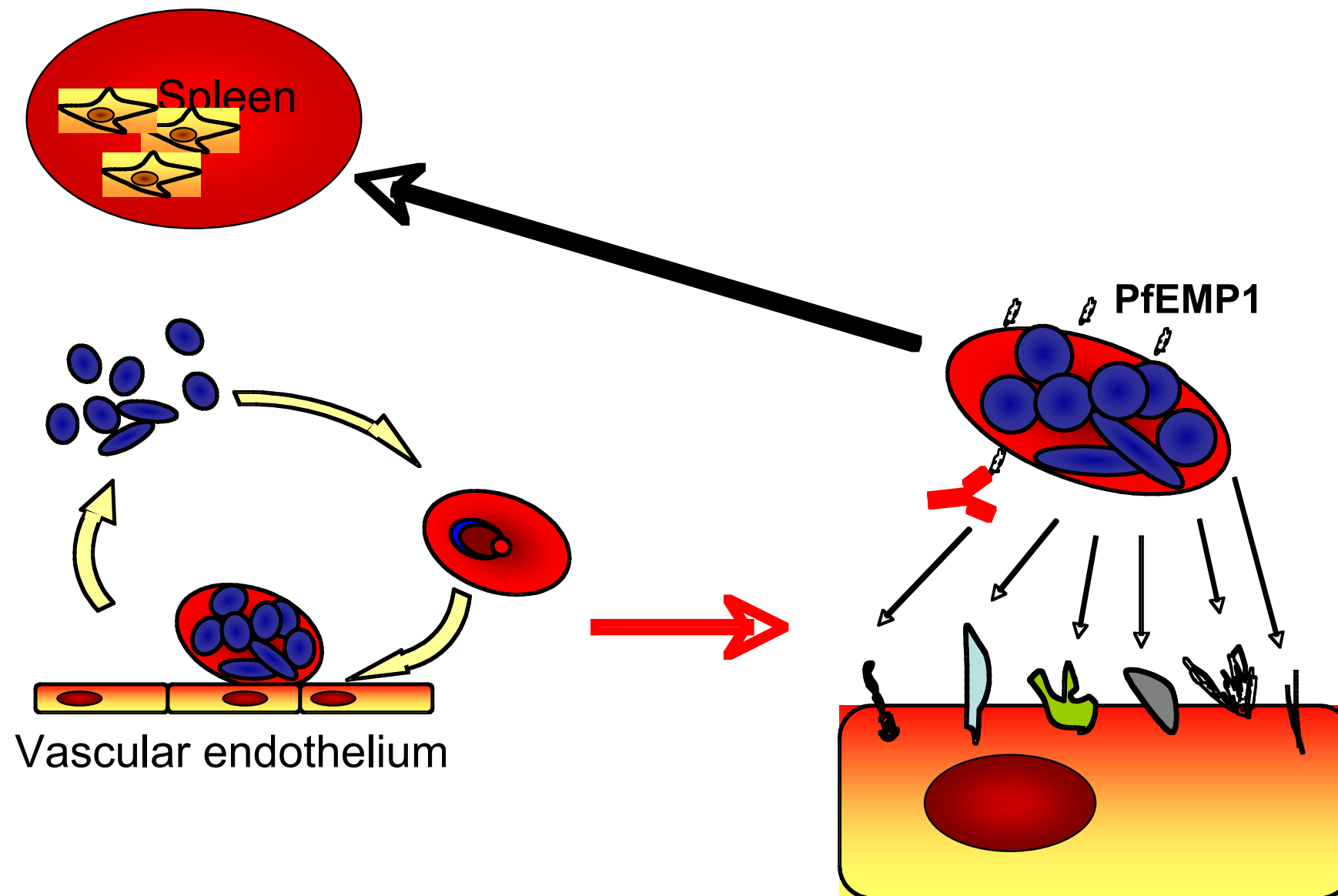
# Blood stage parasites



# Blood stage parasites

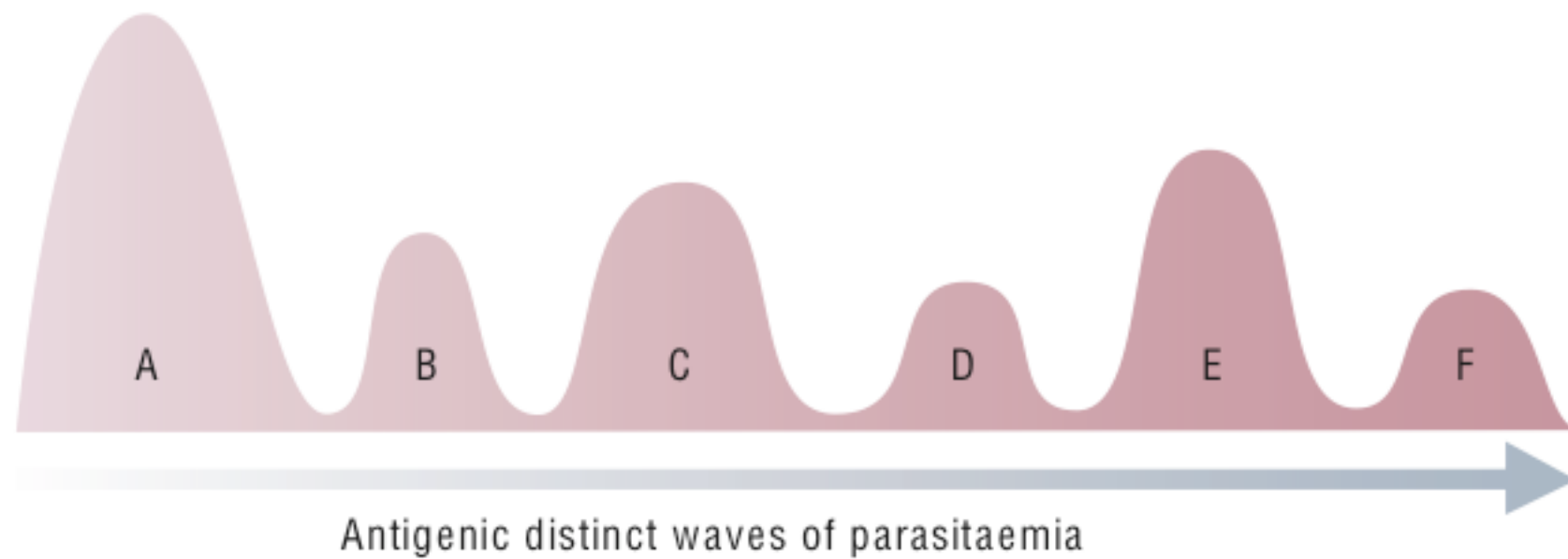


# Blood stage parasites



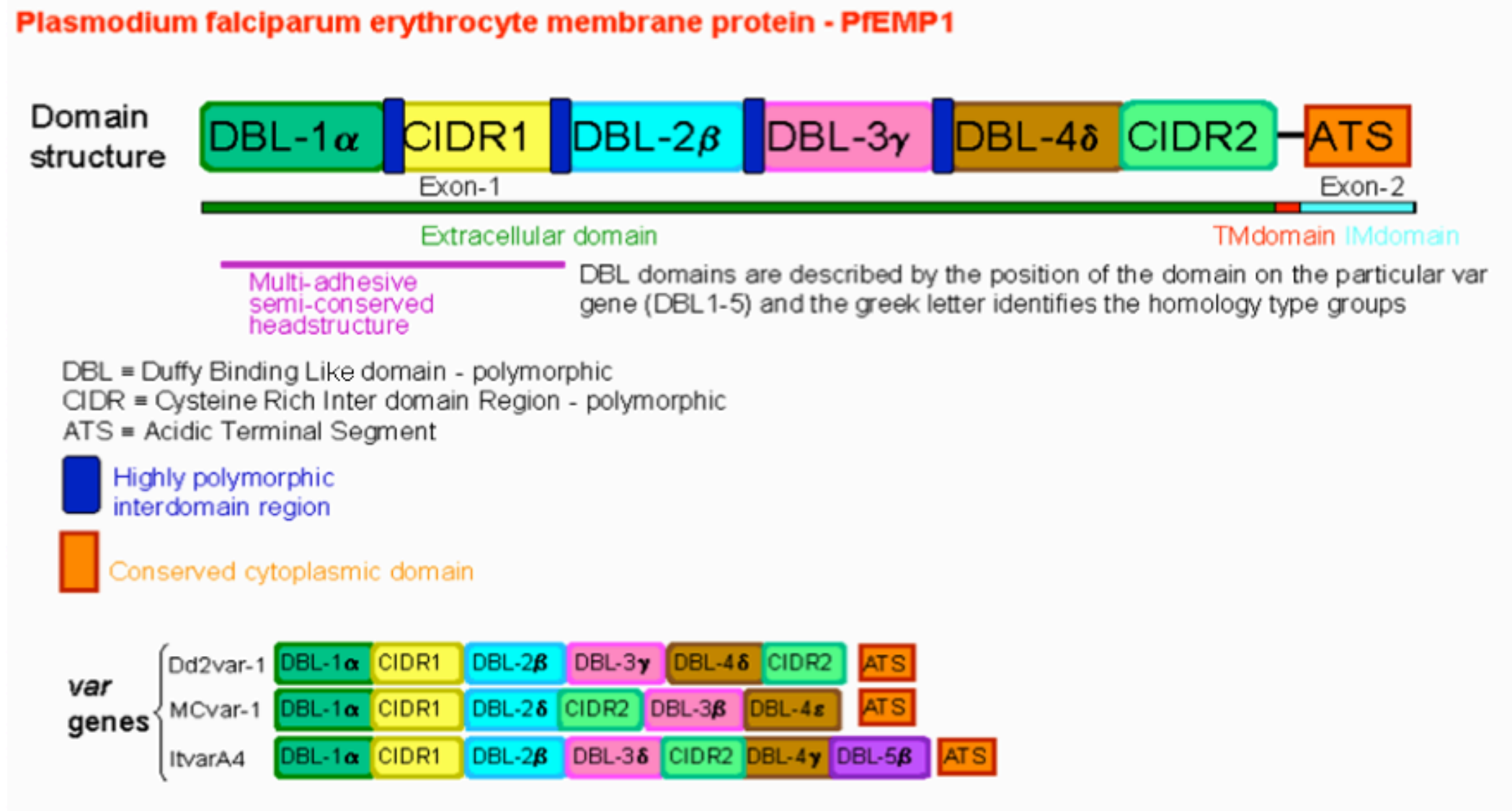


# PfEMP1 variant antibodies



- Encoded by the *var* gene family
- The *Plasmodium falciparum* genome contains ~60 copies of the *var* gene
- Extremely diverse

# PfEMP1 domain structure



# Pregnancy associated malaria (PAM)

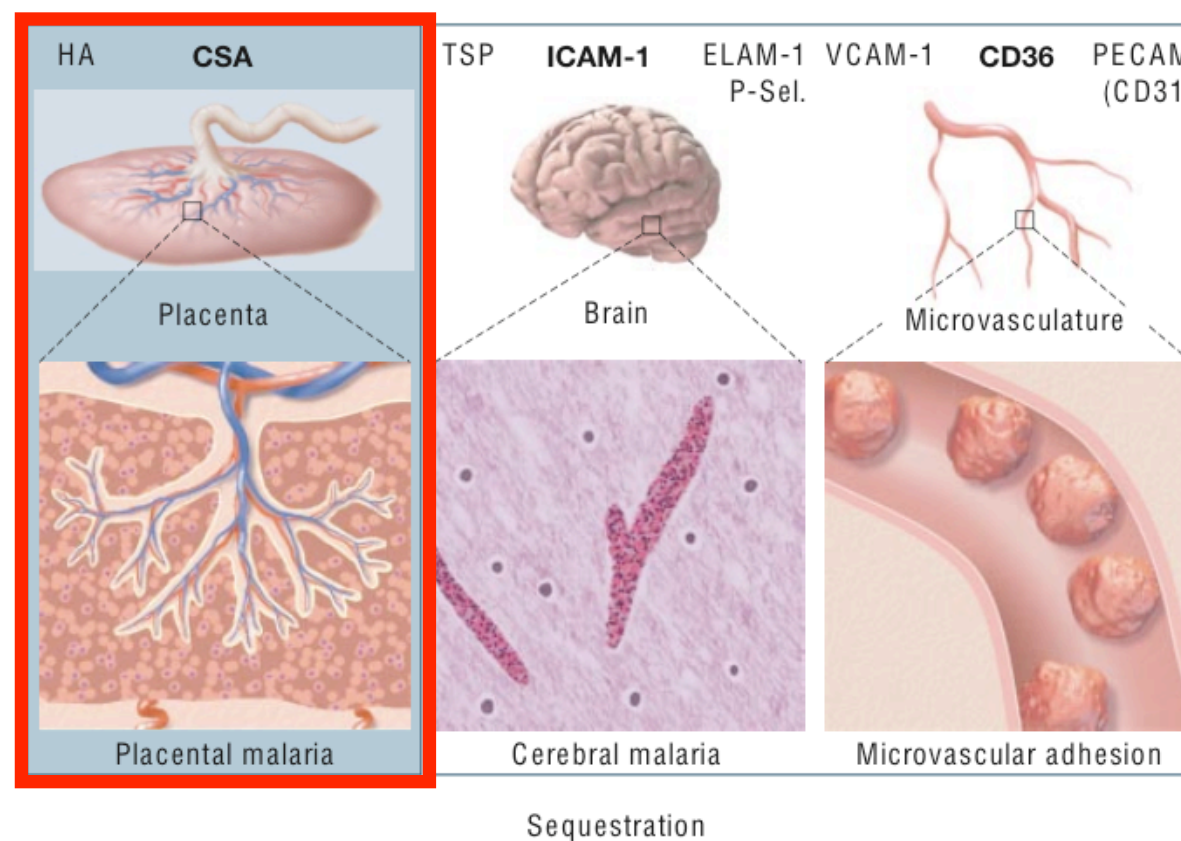
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- Maternal anaemia and death (~10,000 cases/year in Africa)
- Perinatal deaths (~200,000 cases/year in Africa)
- Spontaneous abortion
- Stillbirth
- Premature delivery
- In some endemic regions, 40% of all newborns have low birth weight caused by PAM



# Pregnancy associated malaria (PAM)

- Caused by PfEMP1 binding to CSA in placenta
- PfEMP1 variant: VAR2CSA



# PfEMP1: VAR2CSA

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- Upregulated in iRBC adhering to CSA and in placental isolates
- Highly conserved between falciparum strains compared to most other var genes (nucleotide sequence diversity is 10-30 %)

# Goal for this afternoon

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- Combine all your knowledge of bioinformatics
- Find a vaccine candidate for pregnancy associated malaria
- Help the world and save lives of children
- All in less then 3 hours

